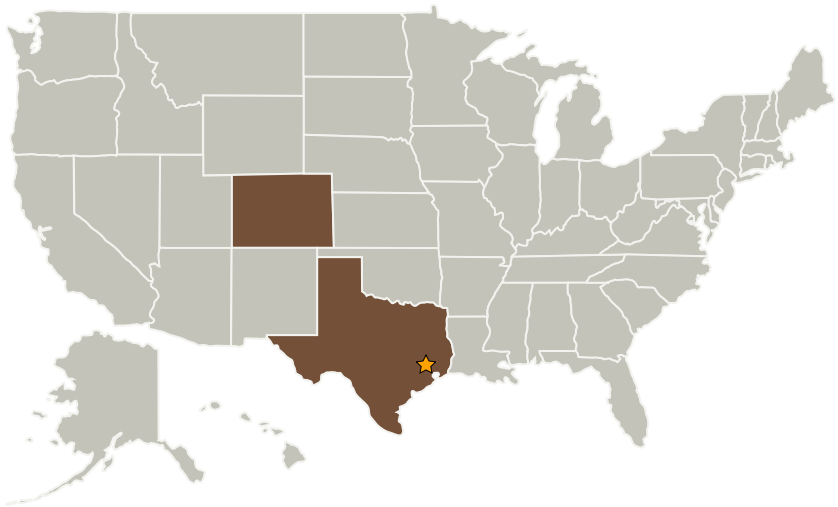
# Ultra High Barrier Nanocomposites, Phase I

Completed Technology Project (2009 - 2009)

## Project Introduction

As the length of manned space missions increase, requirements to sustain those missions increase proportionately. Daily food supplies require food packaged and sent from earth, preparation mechanisms and waste treatment. The window for food preservation could be 3-5 years. This will require food packaging that provides excellent barriers to water vapor and oxygen, is durable at the processing conditions (retort sterilizing, microwave processing), and has low mass. Storage and disposal of used food packaging becomes a significant issue. Incineration is a reasonable waste treatment strategy, but is incompatible with materials used currently for high barrier packaging, like aluminum foil (which leaves ash). TDA Research, Inc. proposes to develop a multilayer nanocomposite film with superb resistance to permeation by water vapor and oxygen, for use as an extended shelf life food packaging material. We propose to prepare nanocomposites from commercially available packaging plastics and TDA's surface-modified nanoparticles. TDA's nanocomposite research has focused on the design of surface treatments to produce nanoparticles compatible with targeted host polymers. We can form well-dispersed nanocomposites with several packaging plastics and have seen improved barrier properties -- with nanoparticle contents less than 5%. TRL at the end of the Phase II contract will be at Level 5.

## Primary U.S. Work Locations and Key Partners




Ultra High Barrier Nanocomposites, Phase I

## Table of Contents



## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Johnson Space Center (JSC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

# Ultra High Barrier Nanocomposites, Phase I

Completed Technology Project (2009 - 2009)

| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Johnson Space Center(JSC) | Lead Organization | NASA Center | Houston, Texas |
| TDA Research, Inc. | Supporting Organization | Industry | Wheat Ridge, Colorado |

| Primary U.S. Work Locations | |
|---|---|
| Colorado | Texas |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.2 Water Recovery and Management